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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,757	10/30/2001	Tyler A. Lowrey	INTO-0013-US (P13341)	8684

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EXAMINER
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SCHILLINGER, LAURA M

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 09/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/020,757	<b>Applicant(s)</b> LOWREY, TYLER A.	
	<b>Examiner</b> Laura M. Schillinger	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10, 31-37 and 41-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 31, 32, 34-37, 41-46 and 48-50 is/are rejected.
- 7) ☒ Claim(s) 33, 47 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claims 33, 34 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10 and 34-37, 41-44, and 48-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Reinberg et al ('671).

In reference to claim 1, Reinberg et al teaches a method comprising:

Forming a lower electrode (Col.2, lines: 43-45);

Covering the lower electrode with a protective layer (Col.2, lines: 43-45);

Forming a pore over the covered lower electrode (Col.2, lines: 45-46);

Opening the protective layer to the lower electrode (Col.2, lines: 45-46); and

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Forming a chalcogenide material over the upper side of the lower electrode (Col.2, lines: 49-51).

In reference to claim 2, Reinberg et al teaches further comprising:

Defining a singulated opening (Col.7, lines: 40-50);

Forming a cup-shaped phase change material in the opening (Col.8, lines: 57-65);

Forming a thermally insulating material in the cup-shaped phase change material (Col.9, lines: 35-40)

In reference to claim 3, Reinberg et al teaches including defining the phase change material using a planarization process (Col.9, lines: 10-20).

In reference to claim 4, Reinberg et al teaches including defining the phase change material using a CMP technique (Col.9, lines: 10-20).

In reference to claim 5, Reinberg et al teaches including defining a spacer in the singulated opening (Col.8, lines: 20-30).

In reference to claim 6, Reinberg et al teaches including defining an electrode in the opening (Col.8, lines: 35-50).

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In reference to claim 7, Reinberg et al teaches including using the sidewall spacer to define the cup shape of the phase change material (Fig.8 (52)).

In reference to claim 8, Reinberg et al teaches including forming a base layer over a substrate and forming the lower electrode over the base layer (Fig.12 (40)).

In reference to claim 9, Reinberg et al teaches including sequentially forming the lower electrode and then the protective layer (Col.8, lines: 50-57).

In reference to claim 10, Reinberg et al teaches including etching the lower electrode and protective film using the same mask (Col.9, lines: 25-40).

In reference to claim 34, Reinberg teaches including forming the protective layer of an insulator (Col.9, lines: 30-35).

In reference to claim 35, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride (Col.9, lines: 30-35).

In reference to claim 36, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$  (Col.9, lines: 30-35).

In reference to claim 37, Reinberg teaches a method comprising:

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Forming a protective layer over a lower electrode of a phase change memory(Col.8, lines: 57-65 and Col.9, lines: 30-35).

In reference to claim 41, Reinberg teaches including forming the protective layer of an insulator(Col.9, lines: 30-35)..

In reference to claim 42, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride(Col.9, lines: 30-35)..

In reference to claim 43, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$ (Col.9, lines: 30-35)..

In reference to claim 44, Reinberg teaches a method comprising:

Forming an electrically insulating protective layer over a conductive lower electrode of a phase change memory (Col.2, lines: 43-45);

Forming a pore over the insulating protective layer (Col.2, lines: 45-46);

Etching through the pore to open up the protective layer (Col.2, lines: 45-46); and

Forming a chalcogenide material in the pore (Col.2, lines: 49-51).

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In reference to claim 48, Reinberg teaches including forming the protective layer of an insulator (Col.9, lines: 30-35)..

In reference to claim 49, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride(Col.9, lines: 30-35)..

In reference to claim 43, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$ (Col.9, lines: 30-35)..

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 31-32, 38-39 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reinberg et al ('671) as applied to claims above, and further in view of Ovshinsky ('592).

In reference to claims 31 and 32, Reinberg teaches forming a lower electrode and a protective film. However, fails to explicitly teach forming both in the same deposition chamber.

Ovshinsky teaches implementing the same deposition chamber for sputtering an electrode material and then a silicon nitride film (Col.14, lines: 20-25).

It would have been obvious to one of ordinary skill in the art to modify Reinberg's teachings to include depositing both the electrode material and protective material in the same deposition chamber as claimed by the Applicant because Reinberg teaches to form such layers by PVD (Col.8, lines: 40-45) and Ovshinsky teaches his chamber may be implemented in PVD deposition processes (Col.12, lines: 25-30).

*Allowable Subject Matter*

Claim 33, and 47 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Reinberg teaches forming a lower electrode and a protective film. However, fails to explicitly teach forming both in the same deposition chamber.

Ovshinsky teaches implementing the same deposition chamber for sputtering an electrode material and then a silicon nitride film (Col.14, lines: 20-25).

It would have been obvious to one of ordinary skill in the art to modify Reinberg's teachings to include depositing both the electrode material and protective material in the same deposition chamber as claimed by the Applicant as explained above. However, even in combination, Reinberg and Ovshinsky fail to teach nor suggest the claimed limitation of claim 33 which includes forming the electrode and protective layer in the same deposition chamber



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*without venting back to atmosphere.* Consequently, Applicant's claim contains allowable subject matter.

### ***Response to Arguments***

Applicant's arguments filed 6/23/05 have been fully considered but they are not persuasive. Applicant argues that Reinberg fails to anticipate Applicant's amended claim language because the reference fails to teach protecting the lower electrode; this is incorrect see Col.2, lines: 44-45. Applicant further argues that Reinberg defines the pore prior to defining the electrode or chalcogenide; this is also incorrect see Col.2, lines: 43-51. Applicant's claim language merely reflects the known prior art methods taught by Reinberg.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



09/02/05

Laura M Schillinger  
Primary Examiner  
Art Unit 2813